

VISION

Parts of the Eye:

Cornea – protective covering of the eye

Iris – muscles that control pupil opening (eye color)

Retina – area along the back of the eye that image is projected on to

Pupil – opening of the eye allowing light in

Lens – reshapes to focus light on the retina

Fovea – center of the retina (only made up of cones)

Seeing in the Eye:

Hue – light (all colors = white)

Wavelength – determines color hue

Pigment – from paint (all colors = black)

Amplitude – determines brightness of light

What Cones Detect – cells in the back of the retina that detect certain colors

What Rods Detect – cells in the back of the retina that detect shading, black/white contrasts, and movement

Trichromatic Theory of Color Vision – all colors detected by the eye are a mix of three primary colors – red, green, and blue – detected by the cones of the eye

Opponent-Process Theory – as cells for a specific color “fire” in response to detecting that color, the “opponent” cells are inhibited... when cells stop being stimulated the opponent cells fire causing an *afterimage*

Example: A U.S. flag that is green and yellow will “project” an afterimage that is red and blue

Seeing and the Brain:

Optic Nerve – bundle of nerves leaving the back of the eye that send signals to the visual cortex

Transduction – process of changing what the senses detect into an electrochemical signal in the nervous system

Parallel Processing – process of the brain piecing together the varied images and movement that the cells of the eye detect (color, contrast, shape, depth, movement all processed simultaneously)

Example: The flight of a bird (different parts of the eye detect color, contrast, shape, and movement – brain puts it together at the same time)

Feature Detection Theory – specific neurons in the visual cortex are “programmed” only to detect certain shapes or movement

Example: Only certain neurons fire when seeing a vertical line while others stay at resting potential

AUDITION

Parts of the Ear:

Inner Ear – beyond the eardrum

Hammer, Anvil, Stapes – bones of the inner ear; vibrate in response to sound waves

Oval Window – connection of bones of inner ear to the cochlea

Cochlea – snail-shaped part of the inner ear containing hair cells that move in response to changes in pressure

Semi-Circular Canals – Fluid-filled areas of ear off the cochlea that control Vestibular sense

Hearing in the Ear:

Hearing a result of changes in pressure within the cochlea triggered by vibrations in the inner ear

Frequency – number of wavelengths per segment of a sound; determines pitch

Pitch – “highness” or “lowness” of sound

Place Theory – idea that there are specific cells in the cochlea that respond to specific changes in pressure

Frequency Theory – idea that specific cells in the cochlea that respond to specific changes in pitch

GUSTATION AND OLFACTION

How we Smell:

What we Sense – olfactory receptors in the nose detect *chemical* stimuli from the environment

Smell and the Brain – olfactory pathway from the nose to the brain closely linked to taste pathway and *limbic system*

How we Taste:

What we Sense – taste receptors on the tongue detect *chemical* stimuli from the environment; certain parts of tongue are more tuned to certain tastes than others

Taste and the Brain – taste pathway from the tongue to the brain closely linked to olfactory pathway and *limbic system*

SKIN AND BODY SENSES

How we Feel:

What we Sense – Skin detects various changes in *temperature* and *pressure* from the environment

Gate Control Theory of Pain – as pain signals are received from pain receptors by certain interneurons in the spinal cord, the pain signals are “closed off” and not sent to the brain

Overall Body Senses:

Kinesthesia – sense of body parts and overall orientation of our body with the environment around us integrates senses

Vestibular Sense – controls sense of equilibrium, which impacts our sense of balance; controlled by fluid levels in the semicircular canals of the inner ear